THE FOSSIL RECORD AND THE CAMBRIAN “EXPLOSION”: AN UPDATE

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CROWN GROUPS, STEM GROUPS, AND SISTER GROUPS
Cambrian “Explosion” Timeline
Ediacaran
Doushantuo - 580 my
Demosponges

Presence of sponges extended to 700 my by biomarkers
Ediacaran Hexactinellid Sponges
Ediacaran Cnidaria (?)
“Jellyfish-like” Organisms

Mawsonites

Nemaia 600 my
Neoproterozoic Cnidarian (Anthozoa) Polyps and Stalks

Octocoral? Zoantharian?
Ediacaran Calcified Metazoans

Sinotubulites and Cloudinia

Namacalathus

Sinocyclocyclicus
Early Cambrian Anemone-like Anthozoans

Eolympia

Saturday, July 20, 2013
**Ediacaran Algal Mats**

Wrinkled Microbial Mat

Mat Ground with Vendian Fossils
Ediacaran Bilaterian

Spriggina

Marywadea
Yorgia and Dickinsonia
Ediacaran
Stem Mollusk
Kimberella
with grazing tracks
Ediacaran horizontal burrows
*Helminthopsis, Helminthoidichnites and Gordia*
Below-mat Miners: Oldhamia
Trepichnus pedum
basal Cambrian burrows
Cambrian
Priapulid worms
PALAEOSCOLECID WORMS
Stem Mollusks, Annelids and Sister Taxa

- Halkieria
- Odontogriphus
- Canadia
- Wiwaxia
- Orthozanclus
Mollusk Classes
Helcionelloids as stem mollusks

*Archaeospira* and *Watsonella*

*Oelandiella*

*Aldanella*

*Fordilla*
Early Cambrian Tommotids as Stem Brachiopods
Cambrian Brachiopods
CAMBRIAN LOBOPODS
EvoLution of Arthropod Body Plan
Early Cambrian Stem Arthropod Shankouia
Anomalocarid
Stem Arthropod
Early Cambrian Ventulocystids Stem Echinoderms
Ctenoimbricata

Cambrian
Echinoderms

Cinctan, Stylophoran, Eocystitid
Basal Echinoderms

Helicoplacoids

Edrioasteroids

Eocrinoid

Golgia
EARLY CAMBRIAN STEM DEUTEROSTOMES

VETULICOLIANS

Saturday, July 20, 2013
Cambrian
Cephalochordates
Craniate

Haikouella
Yunnanzoon
Haikouichthys
CAMBRIAN CRANIATE CHORDATE (STEM VERTEBRATE?)

Myllokunmingia
Molecular vs Fossil Record
Sources of Illustrations

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SOURCES OF ILLUSTRATIONS

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❖ Slide 6
  ❖ Nemaia image from the Virtual Fossil Museum at http://www.fossilmuseum.net/fossils/Cnidaria/Nemaia-simplex/Nemaia.htm
Sources of Illustrations

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SOURCES OF ILLUSTRATIONS

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- Slide 10
  - Mistaken Point Ediacaran image by G. M. Narbonne from online exhibits of Miller Museum of Geology, Queens Univ., Kington, ON, CA. [http://geol.queensu.ca/museum/](http://geol.queensu.ca/museum/)
  - Wrinkled microbial mat image from [http://www.gondwanaresearch.com/hp/wrinkle.jpg](http://www.gondwanaresearch.com/hp/wrinkle.jpg)

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- *Yorgia* image and resting traces from Wikimedia Commons, 2009. Source: Arkhangelsk Regional Museum. Author: Aleksey Nagovitsyn.

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- *Helminthopsis* image from online exhibits of Miller Museum of Geology, Queen University, Kington, Ontario, CA. [http://geol.queensu.ca/museum/](http://geol.queensu.ca/museum/)
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- Priapulid burrow reconstruction from Wikimedia Commons, 2008. Author: Smokeybjb.

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- *Halkeria* image from Wikimedia Commons, photo by Jakob Vinther. Source: en.wikipedia.org
- *Wiwaxia* image from Smithsonian National Museum of Natural History at http://paleobiology.si.edu/burgess/wiwaxia.html
- *Canadia* image from Smithsonian National Museum of Natural History at http://paleobiology.si.edu/burgess/canadia.html
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- Cambrian brachiopods from Oklahoma illustrated in Sam Noble Museum of Natural History, Norman, OK.  [http://commonfossilsofoklahoma.snomnh.ou.edu/cambrian-fossil-gallery](http://commonfossilsofoklahoma.snomnh.ou.edu/cambrian-fossil-gallery)
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- Helicoplacoid image from palaeobiology page of Uppsala University at [http://www.palaeontology.geo.uu.se/Mainpages/fom2009.html](http://www.palaeontology.geo.uu.se/Mainpages/fom2009.html)
- Edrioasteroid image from [http://www.geol.umd.edu/~tholtz/G331/lectures/331echin1.html](http://www.geol.umd.edu/~tholtz/G331/lectures/331echin1.html)
- Eocrinoid *Golgia* image from Wikimedia Commons, 2009. Author: Kevmin.
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